

RAPTOR RESEARCH NEWS

Volume 4

*Numbers one through six
January - December, 1970*



RAPTOR RESEARCH FOUNDATION, INC.

Editors: Byron E. Harrell; Donald V. Hunter, Jr.

The *Raptor Research News* is designed as an informal information exchange. Contributions are edited, but are not usually submitted for refereeing as in formal scientific journals of record. Some of the items are progress reports or expressions of ideas to stimulate discussion; thus citations of contents of the *News* should be avoided unless approval is received from the author.

NOTES, NEWS, AND QUERIES	70
Editors' Notes	70
Bald Eagles Poisoned by Mercury	70
Osprey Management in Oregon	71
Harvesting the Peregrine	71
Birds of Prey Protected	71
Peregrines in Ireland	72
RSBP's New Film	72
A Word for the Predators	72
Golden Eagle Protection	72
Importing Birds of Prey into Great Britain	73
Nature Protection Act	74
Queries and Answers	74
Answers to Questions on Care and Feeding of Young Raptors	75
RAPTOR RESEARCH SURVEY: 1970 No. 3	76
BREEDING PROJECT INFORMATION EXCHANGE (15) ...	77
THINK WITH A GOOD NOSE NEAR A NEST (Frances Hamerstrom)	79
RAPTOR RESEARCH FOUNDATION CONTINENTAL OSPREY STATUS SURVEY-1969 (Thomas Dunstan)	81
A PROGRAMME FOR BREEDING GOSHAWKS (<i>Accipiter gentilis gentilis</i>) IN CAPTIVITY WITH REFERENCE TO THEIR BREEDING HABITS IN THE WILD STATE (David Kent)	104

RAPTOR RESEARCH FOUNDATION, INC.

c/o Biology Department

University of South Dakota

Vermillion, South Dakota 57069 U.S.A.

NOTES, NEWS, AND QUERIES

Editors' Report. Although this particular issue has gotten well behind schedule, we wish to report that a number of items are in process.

1. Material for the July-August issue of the *News* is in hand and will be processed in the near future.

2. Organizational problems have delayed the appearance of the first *Raptor Research Abstracts*. Most of them have been overcome and its regular issues will be soon ready. The first issue or two will be a little smaller than we anticipate to be average and will also contain less of the unusual items, but we hope to be able to increase the scope of our coverage each month. Special effort will be made this fall to arrange prompt coverage of the European literature.

3. The Index and Title Page for Volumes 1-3 of the *News* has been unduly delayed, but is nearly ready for distribution to all subscribers.

4. The report on the Cornell Conference which was to be completed shortly after the conference was at first delayed by late receipt of some abstracts, and then by the press of the regular issues of the *News*. It is now nearly ready for printing and will be sent to subscribers shortly.

5. The first number of *Raptor Research Reports* a literature review on falconiform reproduction is nearly all set up for printing, and we hope to have a flier advertising its availability in our next issue. We think it is a valuable work at a modest price.

This fall Lee Eberly will be assisting in the editorial duties while Harrell is away. Dr. Harrell will be on a four-month trip in Europe with the principal aim of contacting raptor workers in western Europe. We hope to have some reports on the status of research on raptors in this area.

Bald Eagles Poisoned by Mercury. Two American bald eagles found dead in Minnesota last year apparently were victims of mercury poisoning, according to a spokesman for the U. S. Bureau of Sport Fisheries and Wildlife.

The spokesman said that tests for mercury showed that the eagles' kidneys contained 117 and 130 parts per million of mercury residues, enough to cause death.

The tests were conducted at the bureau's wildlife research center at Patuxent, Md. The Minnesota eagles were the first to be tested for mercury poisoning, the spokesman said.

One of the eagles was found on a street in Red Wing. The other was reported by Alfred Grewe, a professor at St. Cloud State College.

Both birds had been checked for DDT and other pesticides but test results showed low amounts of those substances.

The spokesman for the federal agency said that bureau wildlife specialists were "shocked" at test results because it may mean that mercury represents a new threat to the survival of the rare bald eagles.

Scientists suspect the birds accumulated the mercury by eating fish from mercury-polluted waters.

In recent months commercial fishing has been stopped in parts of Canada and Michigan because of the presence of mercury in fish. (From AP report from St. Paul, Minnesota, quoted in *Sioux Falls Argus Leader*, June 14, 1970).

Osprey Management in Oregon. An agreement was reached on October 10, 1969, between the Forest Service of the United States and the Oregon State Game Commission on the management of Osprey at the Crane Prairie Reservoir. The Memorandum of Agreement appears in a well illustrated pamphlet, "Management Plan for the Crane Prairie Reservoir Osprey Management Area" prepared by Hadley B. Roberts, Wildlife Biologist, Deschutes National Forest, Bend, Oregon.

Harvesting the Peregrine. In 1968 the Fish and Wildlife Branch of British Columbia gave permits for the capture of 30 Peale's falcons (the local race of peregrine), but it is believed that a further ten were taken illegally. In 1969, a quota of only ten was allowed, all to be taken by the Fish and Wildlife Branch itself, and the fee was increased from \$20 to \$200, to compensate the Branch for the extra costs. (*Newsletter*, Federation of B.C. Naturalists). (From *Kingfisher* 5(3):9, Jan.-Feb. 1970).

Birds of Prey Protected. All birds of prey and owls are now protected in Morocco, by a decree of the Minister of Agriculture in September 1969. (Information: H. Deetjen.) (From *Kingfisher* 5(3):12, Jan.-Feb. 1970).

Peregrines in Ireland. The peregrine population in Ireland is going the same way as in other countries where the environment is severely contaminated by pesticides, according to the Irish Wildbird Conservancy. The number of breeding pairs in the Irish Republic fell from 163 in 1947/50 to only 36 in 1967, and the 1968 figures, still being analysed, show another startling decrease in breeding success. (From *Kingfisher* 5(4):7, Mar.-Apr. 1970).

RSPB's New Film. One of the RSPB's (Royal Society for the Protection of Birds) main contributions to European Conservation Year is its fine film of European birds of prey, *The Winged Aristocrats*, which has taken two and a half years to make. All 5000 tickets for its premiere at the Royal Festival Hall, London, on February 21 were sold out ten days before the show. It is hoped that a quarter of a million people will see the film this year. (From *Kingfisher* 5(4):7, Mar.-Apr. 1970).

A Word for The Predators. "To the game preservers", said the Minister of Agriculture at the London Conference on "Agriculture and the Environment" in January, "I ask for a more generous attitude to predatory birds and mammals. Nearly all the scientific evidence shows clearly that the effect of bird predators on game stocks is insignificant". (From *Kingfisher* 5(4):8, Mar.-Apr. 1970).

Golden Eagle Protection. R. W. Burwell, Regional Director of the Bureau of Sport Fisheries and Wildlife (Twin Cities, Minnesota 55711) issued the following notice on April 21, 1970.

Secretary Hickel recently announced that blanket permits to control depredation by golden eagles will no longer be issued.

In recent years, such permits have not been provided in Region 3, nor have individual permits been issued or contemplated.

In the interest of protecting golden eagles, all field personnel shall be on the alert to learn of known or rumored losses to livestock by eagles, and to investigate such reports to determine validity and/or extent of damage.

Any reports of dead eagles or the location of carcasses of eagles shall be promptly reported to the nearest U. S. Game Management Agent who shall, with the aid of Wildlife Services and other available Bureau personnel, investigate the matter to determine the cause of death.

Persons responsible for the death of eagles shall be vigorously investigated and prosecuted whenever possible.

Agents-in-Charge shall advise this office by memo in all instances of known or suspected illegal kill of eagles.

Importing Birds of Prey into Great Britain. An order of the Home Office, Whitehall, called "Wild Birds (Importation) Order 1970)" to be effective July 1, 1970, has the following explanatory note: "This Order prohibits the importation of live birds of prey and live owls throughout the year, except under authority of a licence granted for scientific or other purposes specified in section 10 of the Protection of Birds Act 1954."

"An accompanying Press Notice included: "The Home Secretary has made an Order under the Protection of Birds Act 1954, prohibiting the importation into the United Kingdom, except under licence, of all birds of prey of the order falconiformes and all live owls of the order strigiformes. The restrictions come into force on July 1, 1970 and licenses will be necessary for all importations after June 30, 1970.

"There are 405 species affected. Of these, 271 are birds of prey such as eagles, hawks, falcons and vultures and 134 are owls. The restrictions are being imposed in the interests both of international conservation and the welfare of the birds. In recent years there has been a decline throughout the world in the numbers of birds of prey and some species are so seriously threatened as to be in danger of extinction. Many countries already prohibit the export of species whose survival is threatened and the Order will assist those countries in enforcing their ban.

"Birds of prey require special care when kept in captivity. In the past many have been needlessly lost through lack of proper attention. The Order will help to ensure that birds do not get into the hands of persons who lack the facilities to care for them adequately, or who are inexperienced and do not have access to guidance on their correct handling.

"The proposal to impose the importation restrictions was advertised nationally in September 1967. The Order was made after consultation with the Advisory Committee on the protection of Birds for England and Wales, the Advisory Committee on the Protection of Birds for Scotland and the Government of Northern Ireland.

"The Order is the third relating to the protection of birds which the Home Secretary has made during the first four months of European Conservation Year. The other two orders created bird and egg sanctuaries in Wales in the Burry Estuary and near

Haverfordwest. European Conservation Year, which was a British idea, has been organised under the auspices of the Council of Europe, to encourage more rational and responsible conservation of nature and natural resources.

“Under the Protection of Birds Acts 1954 and 1967 it will not be possible to licence importations for any purpose other than scientific, educational, aviculture or falconry.”

Nature Protection Act. On May 27, 1970, Senator Alan Cranston introduced a bill to provide protection for rare and endangered species by amending the Endangered Species Act and by implementation of the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (signed in 1940 by 13 countries and ratified by the U. S. Senate in 1941). Enabling legislation has not been presented and treaty provisions can not be enforced without such action. The treaty lists covered species in an Annex which can be revised from time to time. The only raptor on the original list was California Condor. In the latest revision (1967) the following raptors are listed: Endangered—California Condor (California), Florida Everglade Kite (Florida), and Hawaiian Hawk (Hawaii); Rare—Northern Short-tailed Hawk (Florida), Southern Bald Eagle (Atlantic and Gulf Coasts), American Peregrine Falcon (Alaska, Washington, Oregon, California, Arizona, Texas, Colorado); Peripheral—Zone-tailed Hawk (Arizona, New Mexico, Texas), Gray Hawk (Arizona, New Mexico, Texas), Northern Black Hawk (Arizona, New Mexico, Texas), Northern Aplomado Falcon (Arizona, New Mexico, Texas), Northern Whiskered Owl (Mexico), Northern Ferruginous Owl (Arizona, Texas). In addition there are species of “Rare and Endangered Fish and Wildlife of the United States” which are recommended to be added at the next revision: Rare—Short-tailed Hawk (Florida), Prairie Falcon (California, Texas). The included species could not be hunted, captured, killed, taken, transported, sold, or purchased; bounties on these species are also prohibited. Special Exemptions are included for scientific purposes, public zoos, captivity propagation for later release, and for transplantation. Other details of the bill and Senator Cranston’s explanatory speech are printed in *The Congressional Record* for May 27, 1970 (pp. S7883-S2888).

Queries and Answers. The editors have settled on the title Notes, News, and Queries for a variety of information of interest to our readers. The idea behind the “Queries” term is to encourage the

asking of questions and suggesting ideas for comment by others. Good teachers are aware that questions one person asks are usually on other people's minds but left unasked by them. Since a number of members are interested in the care of young raptors, we have included the following answers to questions on this subject. We write this note to stimulate more of this sort of dialog. We hope that this approach will be utilized freely.

Answers to Questions on Care and Feeding of Young Raptors. The following recommendations are in response to numerous queries on this subject.

1. **Feeding.** To feed young raptors correctly learn from raptors—not from people. What bird feeds its babies liver, beef heart, and supplements? Feed young raptors what their parents would give them. Most food at this time of year is mice or young birds.

Cockerels are excellent food and can be purchased inexpensively in large quantities from hatcheries. These chicks can then be frozen and used as needed. If a freezer is not available, raise young chickens. If nothing else, crawl the barns for squabs and get out a mouse trapline.

2. **Sunlight.** Is your bird getting enough sunlight? It should spend most of every day placed so it can choose between sun and shade. I have had trouble with rickets from time to time and have tried supplements but have never yet successfully substituted for sunlight. If you put your bird outdoors, it will probably put its head in the shade and its rump in the sun with the uropygium held up to sop in sunlight.

3. **Sleeping.** Keep young birds warm at night. As long as a bird sleeps lying down, it should have a sweater or old socks over all of its body except the tail. I am convinced that this is of both physiological and psychological importance.

4. **Castings.** Horned owls sometimes give appreciable castings at about one week of age. Redtails start at roughly three weeks or even later.

5. **Crops.** Tiny hawks take up to 5 full crops a day. Small owls need to be fed just as often, but don't fret if your owlet does not fill its crop. It has no crop!

Fran Hamerstrom, Plainfield, Wisc. 54966.

RAPTOR RESEARCH SURVEY: 1970 No. 3

Symbols used: a—planning; b—in progress; c—nearly finished; d—manuscript; e—in press; f—recently published.

P. Miles Catling (104 Victoria Pk. Ave., Toronto 13, Ont., Can.): Study of Saw-whet Owls (*Aegolius acadicus*) in Eastern North America (b).

Thomas C. Dunstan (Biology Dept., Univ. of South Dakota, Vermillion, S. D. 57069): 1) Migration routes and breeding success of Bald Eagles in Minnesota and South Dakota (with John E. Mathisen) (b); 2) Pesticide content of Osprey and prey items in relationship to breeding success (b); 3) Ecology and ethology of Bald Eagles in Minnesota (d); 4) A comparative investigation of tape recording playback and radio telemetry in studying ecology and ethology of *Bubo virginianus* and *Otus asio* (d); 5) Continental Osprey Status Survey—1969 (f, *Raptor Research News* 4(3): 81-102); 6) Post fledging activities of juvenile Great Horned Owls as determined by radio-telemetry (d); 7) Pesticide content of nestling Bald Eagles on the Chippewa National Forest, Minnesota (with John E. Mathisen) (c).

Byron E. Harrell (Biology Dept., Univ. of South Dakota, Vermillion, S. D. 57069): Survey of raptor research in western Europe (a).

Idaho Cooperative Wildlife Research Unit (Col. Forestry, Univ. of Idaho, Moscow, Id. 83843): Ecology of the Golden Eagle (one M.S. thesis available) (b).

James R. Koplin (School Nat. Res., Humbolt St. Coll., Arcata, Calif. 95571): Osprey-pesticides study, Flathead Lake, Montana (c).

John E. Mathisen (see Thomas C. Dunstan (1, 7)).

Thomas D. Ray, 2Lt. (1560 Ogden Street, Apt. B, Denver, Colo. 80218): Nesting productivity and eggshell thickness among Colorado Prairie Falcons, 1969 (d).

BREEDING PROJECT INFORMATION EXCHANGE

B.P.I.E. No. 15. Tony Robertson (20820 Kittridge, Canoga Park, California 91306) on Peregrine Falcon breeding project (March 1970). The birds are *tundrius* Peregrines. The attempt to breed these raptors in captivity has been a plan of mine for the last several years.

When my birds finally reached an age when successful breeding could be obtained, I fabricated a 12 ft. long, 8 ft. wide, and 7½ ft. high breeding pen. Both birds were released into it on March 7, 1970.

They were both trapped in their first year plumage during the fall migration. Since their capture they have been in excellent health, and I believe this is a function of their diet and care. They have always been brought inside at night and put back on their blocks during the day. Their diet has been pigeon and chicken wings when being flown, and during moult they have been fed 90% day-old chicks and 10% pigeon with six drops of Polyvisol per week added for each bird.

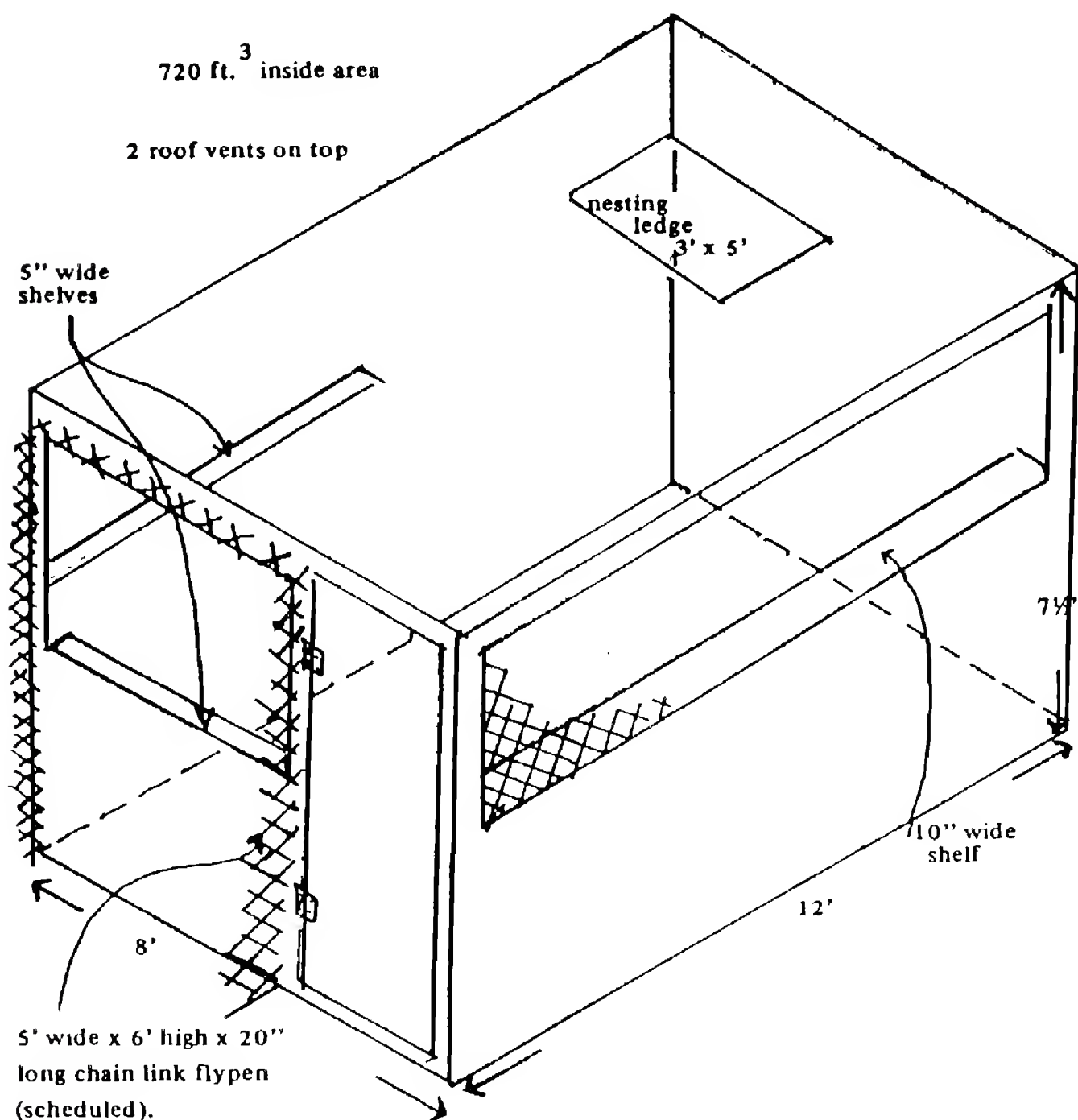
The falcon is now three years old and was flown for the past 2½ seasons. Her temperament has always been fairly even, except she has never liked strangers in the yard nor does she like to be picked up early in the morning. Since she has been released into the breeding pen, she has become very content, spending most of her time lying down on either the nesting ledge or a 6.00 inch wide shelf which exposes her to morning sun. To my knowledge she has never flown into or hung to the chain link fencing covering either window. She sleeps during the night lying down ~~on the nesting ledge~~ with her right wing sometimes hanging down over the edge.

To my knowledge, she has never taken any food away from the tiercel, even when very hungry. She is very trusting and allows me to walk up and stroke her or even pick her up; sometimes I even have to push her to make her stand up. I don't think she has acquired a pair bond relationship with me. I believe she has accepted captivity as she seems very content and trusting. To date she has not shown any signs of wanting to nest, nor has she shown any interest in the tiercel.

The tiercel is two years old and was flown only his first year due to damaged No. 1 and No. 2 flight feathers on his right wing. These feathers were damaged in the first few months of his moult, while being free in a smaller hawk house. He had a very long moult starting on June 22, 1969 and not completing it until February 17, 1970 (referring to primaries and tail feathers).

He was always very even tempered during the period he was flown and through his first moult, and I am sure it was because he was handled every day. Since he has been released into the breeding pen, he has become somewhat wild, not allowing me to pick him up unless I have food in my hand. He also gets very jumpy when

strangers approach and this is something which never seemed to occur during the period when he was flown. When he does get excited, he invariably ends up flying into the chain link fencing which covers the windows and hangs there several seconds before flying to one of the perches. So far, he has not damaged any feathers, but I'm sure the day will come when he does. His relationship with the falcon has not been in any way intimate, and whenever possible, he will take food away from her. He spends the night at the opposite end of the breeding pen from her and, to my knowledge, has never laid down as she does. (Photographs are on file in the Raptor Research Foundation office.)



THINK WITH A GOOD NOSE NEAR A NEST¹

by Frances Hamerstrom
Plainfield, Wisconsin 54966

Banding Nestlings—Reduction of Nest Predation. It is well known that the “scent trail” left by a human visiting a nest probably attracts predators to the nest. Most raptor nest predation is by mammals. It behooves banders of nestlings to “think with a good nose”. Be careful not to leave a scent trail for cats, dogs, raccoons or other predators to follow.

After you have finished your work at the nest of a ground nesting bird walk on past the nest. If you walk back the way you came in, your scent trail will lead predatory mammals directly to the nest. Disturb the cover near the nest as little as possible.

Nests in Trees. Start up the tree with a ladder (it leaves no scent up the trunk) or throw a rope over a branch and climb the rope, keeping clear of the trunk. Another solution, recommended by Bob Dandrea, is to place naphthalene crystals at the base of the tree. Tom Ray writes that an animal inhaling a nose-full of the fumes usually retreats to re-evaluate the consequences of raiding a nest protected by such noxious odors. Dandrea’s idea of using the crystals is especially ingenious as naphthalene fumes are heavy and several handfuls of crystals, spread about the base of the tree, will settle among the ground cover and stay there for a long time—certainly until the human scent has disappeared. Scattering crystals on the ground comprises the first barrier. A second barrier, for example a burlap collar containing naphthalene crystals, should be installed about six or seven feet below the nest.

Warning—Naphthalene fumes are highly toxic. Store in an airtight container.

Some banders spray the trunks of nest trees with commercial repellants designed to keep pet dogs off the furniture. It is possible that such products, particularly those with an oil base, might be worth a try.

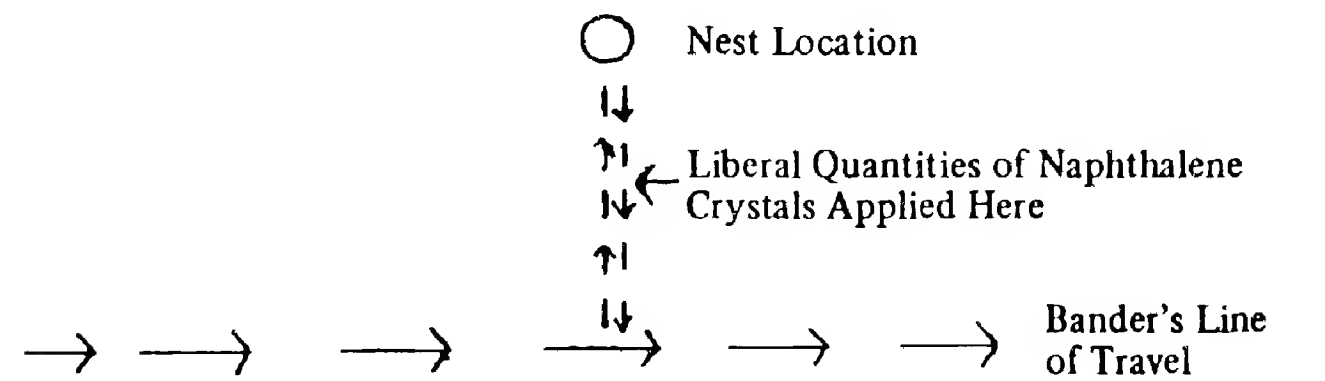
¹This paper originally appeared in a slightly different form as “Some hints to reduce nest predation” in a Memorandum to all Banders from the Bird Banding Laboratory (MTAB-14, pp. 10-11, April 22, 1970).

William Robinson suggests nailing wide metal collars around the trunk of the tree, camouflaged with spray paint to make them less conspicuous. Naphthalene crystals, however, may well be as effective and are less conspicuous.

Some cliff nests have trails leading to them and naphthalene on the trail should increase their security.

Nests on the Ground. If you are aware of the actual nest location, it is best to approach it on a path which would lead **past** the nest. When you are adjacent to the nest, you should turn at right angles to your path of travel, walk directly to the nest and band the nestlings. Once you have banded the nestlings, retrace your steps to your original line of travel.

On the return trip from the nest, sprinkle your trail with liberal quantities of naphthalene crystals. When you reach your original trail, you should again turn at right angles and continue in your **original** direction of travel (see the sketch below). Thus any predator who picks up and follows your original trail would be discouraged from turning off and following your side trail to the nest. He would be more likely to continue following your trail in your original direction of travel.



**RAPTOR RESEARCH FOUNDATION
CONTINENTAL OSPREY STATUS SURVEY—1969¹**

**Summary by Thomas C. Dunstan, Project Chairman
Biology Department, University of South Dakota
Vermillion, S. D. 57069**

This survey was undertaken to compile available information concerning studies of local Osprey populations throughout North America. The purposes of the survey were:

1. To coordinate local studies of ospreys on a continental basis.
2. To bring together individual workers for comparative discussions and problem solving.
3. To provide statistical data for analysis on a continental basis as supporting evidence about the success of this species in North America.
4. To promote further study of this species with emphasis on the ecological relationships between Ospreys and man.

In June, 1969, a three-page form was mailed to persons that I knew were presently or had recently been engaged in Osprey studies throughout North America. In October a second report was mailed indicating the progress of the survey as of 25 October. This report

¹This report of a project of the Raptor Research Foundation Raptor Population Committee was sent in its original form to cooperators on January 20, 1970. It has been rearranged for inclusion in the *News*. This report is a tribute to the cooperation of raptor workers scattered over the continent. The picture of the continent-wide population provides a basis for evaluating the population and the status of our knowledge of this species in North America.

The cooperators and others should use this information in planning further work and in encouraging others who may be able to expand the coverage to additional populations. Ideas on methodology generated by this report should be exchanged to develop the best guide lines for future cooperators. I hope some discussion will lead to an organizational framework to provide for a continuation of this cooperation. *Byron E. Harrell, President, Raptor Research Foundation, Inc.*

included additional terminology and a list of cooperators.

Description of report. The information included in this report is the result of my evaluation and compilation of data submitted by the cooperators. The map of the United States and Southern Canada indicates the locations of Osprey studies included in this report. The reports are arranged geographically from north to south and east to west. Each state or province is assigned a code letter to identify the additional data in the maps and tabular materials; a number is added when there is more than one study in a state. Sketch maps to indicate the study area are identified by code number; specific areas are shaded. The following information is included for each study: location (state or province, county, specific location), principal investigator(s) and years when studied (with cross references to other workers), chronology of the breeding season (all dates are approximate averages unless otherwise indicated), and summary (past and present history of the study and the study area, objectives of particular study, comments and statements on nest site selection, population trend, mortality factors, prey species, and particular techniques applicable to Osprey research).

The data presented in table form include: year, number of known nests, number of active nests, number of nests with known outcome, number of successful nests, number of eggs laid, number of eggs hatched, number of young fledged, and young per successful nest. The following definitions were used:

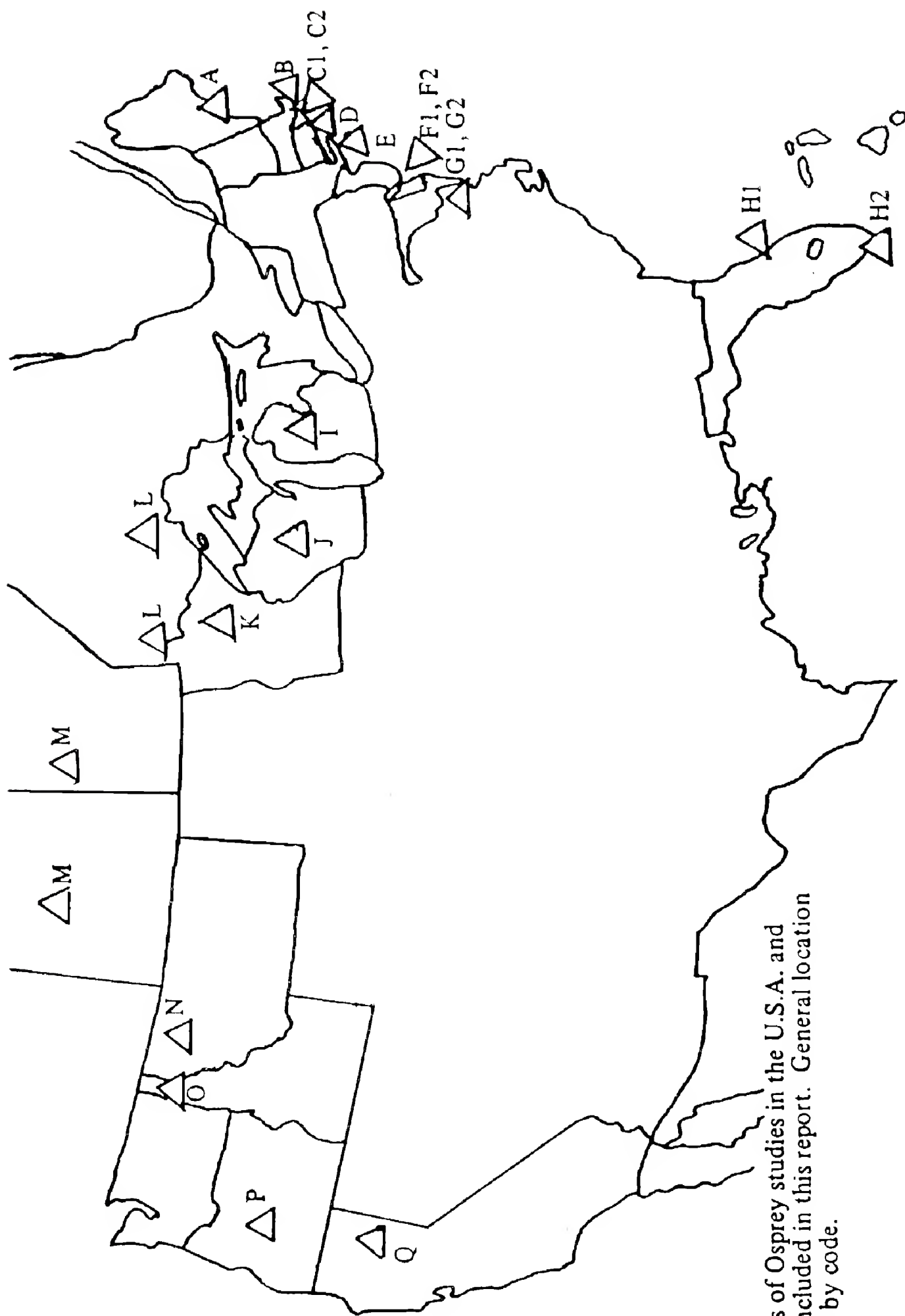
Active nest—a nest at which eggs were laid and adult bird was seen in incubating or brooding position or young in pre-flight stage of development were seen in the nest.

Successful nest—a nest at which at least one egg was hatched and nestling(s) was seen in an advanced stage of development (just prior to fledging time) or fledglings were seen at an active nest.

It is now apparent that a precise terminology is necessary for a survey of this type. Persons specifically interested in the data presented in the tables should write to the investigator in order to verify procedure of censusing.

Several investigators requested that specific information be withheld from publication at this time and persons interested in these data should write to the pertinent investigator. This policy was necessary for the success of a survey of this magnitude.

References referred to in the text are listed by number in the literature cited and include both published and unpublished material. This list is provided to support compiled data and inform interested



Locations of Osprey studies in the U.S.A. and Canada included in this report. General location indicated by code.

persons as to which progress reports and publications are available. No overall conclusions are presented at this time. Fulfilling all the objectives of this continental survey is now dependent on further cooperation between persons interested in this species.

A—Maine (near Louds Island in Muscongus Bay).

Investigator: Kury, 1964

Summary: *History*—Kury made observations on a local population within the Louds Island, Maine quadrangle map of the U.S.G.S. 7.5 Min. series. Survey was concluded on 10 August 1964 (20).

B—Massachusetts (Entire state; Bristol County; Westport River).

Investigators: G. and J. Fernandez, 1964-1969.

Chronology:

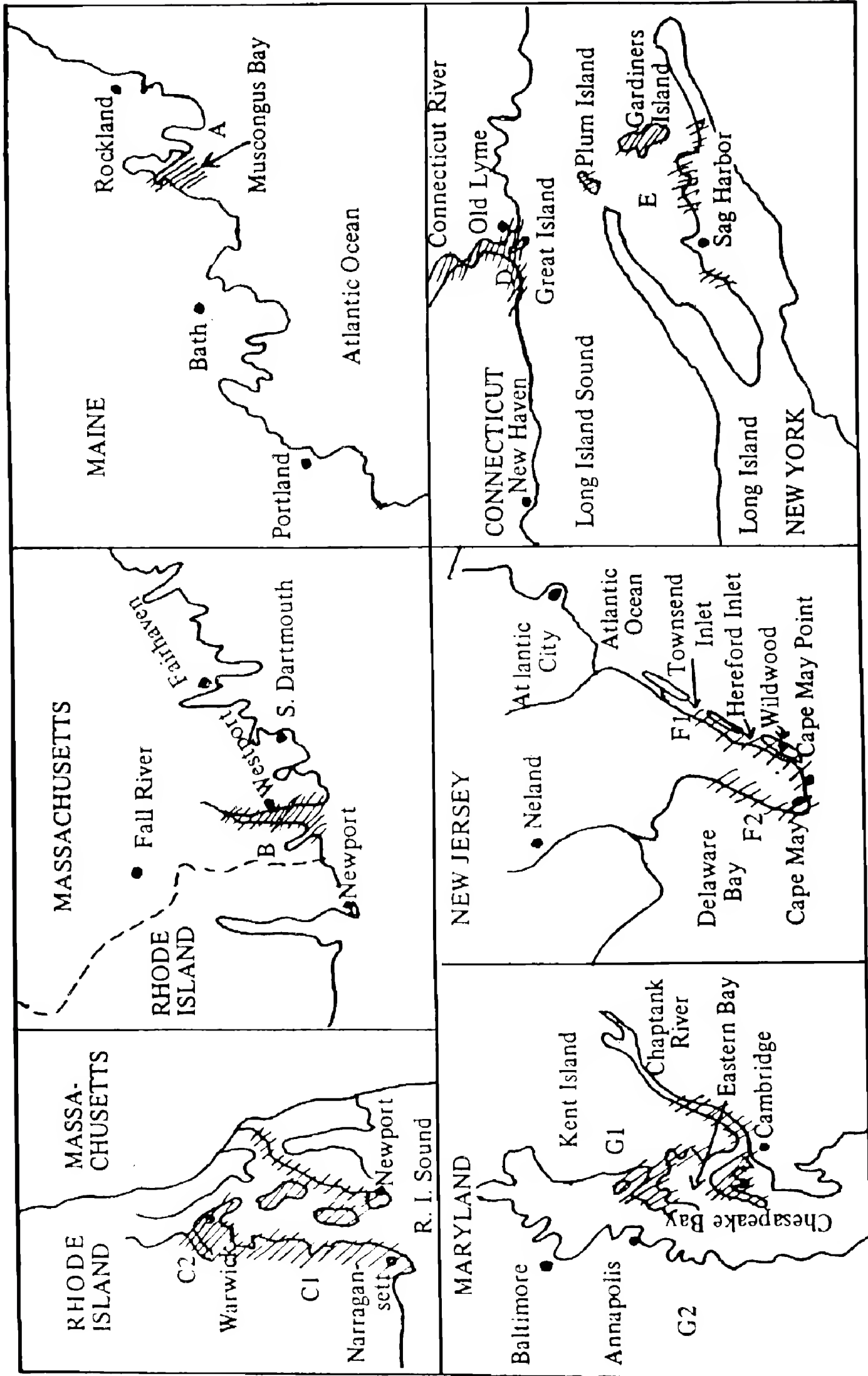
Spring arrival	23 March
Eggs laid	10 March
Eggs hatched	23 May
"Fledging" (first flight)	11 July
Fall departure	-----

Summary: *History*—The Fernandezes initiated the study in 1964 and have published (13, 14). Paul Spitzer has cooperated (see 35). *Study includes*—locating nests, hatching success, behavior at nests, mortality factors, live-trapping and color banding, migration, and pesticide analysis of eggs. *Population success*—no statement on trend. *Mortality factors*—in 1969 five eggs lost as result of storms blowing down nests in dead trees; 1967 three 3-week-old young taken from one nest; one adult female shot (14). *Pesticide analyses*—Egg analysis, Allen H. Morgan, Mass. Audubon, 1964.

Egg. No.	DDT*	DDE*	DDT* technical
1	33.8	39.1	34.5
2	fragments of egg		
3	11.1	20.5	12.9
4	9.7	17.5	10.7

*in ppm dry wt.

Eight eggs are presently being analyzed at Westboro, Mass. Lab. *Techniques*—live-trapping with dho-gaza and Great Horned Owl (17) and captured 10 adults; noose carpet on nest; mirror on pole used to count eggs and nestlings and combined with a camera and telephoto lens for taking pictures (13). Transfer of young from nest with more than one to nests with birds still incubating addled eggs was successful; two young were adopted and fledged. Tower blinds for behavior study.



C1—Rhode Island (Newport, Bristol, and Washington Counties; see table on town of Swansea in Bristol Co. and on Kent Co.).

Investigators: Emerson, 1961-1969 and R. I. Ornith. Club (R.I.O.C.). (see C2.)

Chronology: (From Emerson and Davenport (12)).

Spring arrival	25-30 March
Eggs laid	1 May
Eggs hatched	5 June
"Fledging" (first flight)	1-7 August
Fall departure	Late September and October

Summary: *History*—Census by R.I.O.C. in 1941, 42, 45, 46, 49, 54. In 1954 there were 130 nests in R.I., in 1961 less than 60, and in 1962 further decline (12). One publication by Emerson and Davenport (12) and an annual report by R.I.O.C. *Study includes*—locating nests, reproductive success, and banding. *Population success*—steady decline in number of active nests since 1954 (12). From 1954 to 1961 approximately 50% decline, and from 1961 to 1962 season approximately 40% drop in a year. *Primary prey*—menhaden, alewives (12). *Techniques*—In 1961 helicopter survey by Alfred Hawkes, Cooperator for R.I.O.C.

C2—Rhode Island (Kent County).

Investigator: Brown, 1958-1969 (see C1; see note below).

Chronology:

Spring arrival	25-31 March
----------------	-------------

Notes: Brown made occasional observations prior to 1958; 1959 studied success. From 1967-1969 reported no known nests in study area. Kinsey from Warwick, R.I., knew of one nest that has been inactive since 1967. No previous data given. Oppersdorff states that in 1968 one pair produced 3 young, and in 1969 this nest was taken over by a Great Horned Owl. Tingley from Bristol, R.I., states that one pair returned to nest at Bristol in 1969. This pair stayed approximately 24 hours and left.

D—Connecticut (Middlesex and New London Counties; Old Saybrook and Old Lyme Area).

Investigators: Ames and Mersereau, 1957-1963.

Chronology:

Spring arrival	25 March
Eggs laid	20 April-10 May
Eggs hatched	25 May-15 June
"Fledging" (first flight)	10 July
Fall departure	10 September

Summary: *History*—This study area is one of the oldest

documented in the U.S.A. In 1892 Allen (2) wrote about Ospreys on Plum Island. Abbott (1) and Gill (15) wrote about Ospreys in the area indicated. Ames along with Mersereau began an ecological study in 1957. Other individuals have cooperated (see New York, Maryland, and Rhode Island). Ames has authored the following papers (3-7). Spitzer has reported some 1969 results (35). *Study included*—locating nests, hatching success, behavior at nest, banding, prey survey and analysis for pesticides, pesticide analyses of eggs and one nestling, mortality factors, and erection of artificial nesting platforms. *Nest site selection*—nests built on ground, artificial structures, and trees (red oak, white oak, red maple); and birds are gregarious. *Population success*—a decrease from 200 pairs in early 40's to 71 pairs in 1960 to 24 in 1963 (7) because of failure of eggs to hatch. *Mortality factors*—people taking eggs and nestlings from nests, and disturbance of incubating birds. *Primary prey*—eel early in season and black-backed flounder from March-June. *Pesticide analyses*—seven eggs analyzed averaged 555 micrograms of DDT metabolites (35-100 ppm dry wt.). A 5-day-old nestling contained 624 micrograms DDT metabolites (15.9 ppm wet wt.) and trace of DDT. Fish flesh contained 1.8-7.4 ppm of metabolites and only 0.7-1.8 ppm of DDT wet wt. (7). *Techniques*—experimental nests with exchanges of eggs from Maryland (35).

E—New York (Long Island).

Investigator: Spitzer (see D above)

Chronology: (See D above)

Summary: *History*—Spitzer is doing work in this area. A report of 1969 observations has appeared (35). See Connecticut, Ames *et al.* for information on general region.

F1—New Jersey (Cape May County; Seven Mile Beach; from Townsends Inlet to Hereford Inlet).

Investigator: Jacobs, 1944-1969 (see F2).

Summary: *History*—Initial banding by Jacobs in 1944. Artificial nest platforms constructed in 1966-1969. Jacobs reports 80% use (no. of platforms not given). Eggs sent to Patuxent for pesticide analysis in 1963, 1964, and 1965.

F2—New Jersey (May County; North Cape May; Higbee's Beach, Cape May Point, Mill Lane, Cold Spring, Burleigh, Cape May Court House, Cape May Co. Farm, Cox Hall Cr.).

Investigator: Schmid, 1939- (see F1).

Summary: *History*—Schmid compares the status of the Osprey in Cape May County from 1939 to 1963 (33). He researched in

the 30's and used the data of Jacobs and Reese for comparison in his 1963 paper. Schmid's conclusions are that the population has decreased in his previous study area. Schmid suggests diminution of food supply, frequency of disturbance by man, and environmental pollution as possible factors influencing this decline (33).

G1—Maryland (Queen Annes and Talbot Counties; Kent Island, (see G2)).

Investigator: Reese, 1966-1968.

Chronology: (Earliest dates for Talbot County.)

Spring arrival	17 March
Eggs laid	31 March
Eggs hatched	16 April
"Fledging" (first flight)	2 July
Fall departure	17 August

Summary: *History*—Reese initiated the study in 1966. He has published (31) and compiled five progress (32) reports. *Study includes*—locating nests, hatching and fledging success, mortality factors, nest destruction, prey and ectoparasite survey. *Nest site selection*—nests built on duck blinds, channel markers, artificial nesting platforms, and trees. 70% of total active nests (of 127) were on off-shore structures; others in dead trees. *Population success*—no trend indicated. *Mortality factors*—eggs destroyed as a result of wind storms, and people; nestlings destroyed by people (shooting); adults shot. U.S. Coast Guard destroys nests on channel markers. *Techniques*—erection of artificial nesting platforms which have been utilized. Sampling ectoparasites from nestlings. Use of noose carpet on nest to capture adults. Reese does not recommend using carpet on nests. All work from outboard motorboat. (Note: Reese has requested that specifics be withheld pending publication.)

G2—Maryland (St. Marys and Charles Counties; Chesapeake Bay and Potomac River (see G1)).

Investigators: Wiemeyer, 1969; Krantz and Schmid, 1967 and 1968.

Chronology: (Wiemeyer, for 1969 season).

	early	average
Eggs laid	2 April	13-19 April
Eggs hatched	13 May	18-24 May
"Fledging" (first flight)	1 July	3-9 July

Summary: *History*—In 1968 William Krantz was principle investigator. Wiemeyer was in charge of 1969 work and submitted this data. *Study includes*—locating nests.

reproductive success, mortality factors, banding; analysis of eggs, nestlings, adults, and prey for pesticide residues; egg exchanges. *Nest site selection*—most nests are built on off shore duck blinds. *Population success*—In 1968 and 1969 egg exchanges have biased success (see Ames (3-7) for Conn. work). *Mortality factors*—the U.S. Coast Guard destroyed nests on channel markers resulting in the destruction of eggs and nestlings (Wiemeyer, pers. comm.). *Pesticide analyses*—analyses are being done on prey, eggs, nestlings, adults, and items from the environment (Conn., Maryland, and Potomac River). *Techniques*—egg exchanges between Maryland and Connecticut nests. For pesticide data on Conn. and Potomac rivers see Stickel *et al.* (34).

H1—Florida (Brevard County; Merritt Island).

Investigators: Ellis and Bush, 1964-1969 (see H2).

Summary: *History*—Ellis and Bush have been doing research on Bald Eagles and observations on Ospreys are incidental.

H2—Florida (Monroe County; Florida Bay).

Investigator: Ogden, 1968-1969 (see H1).

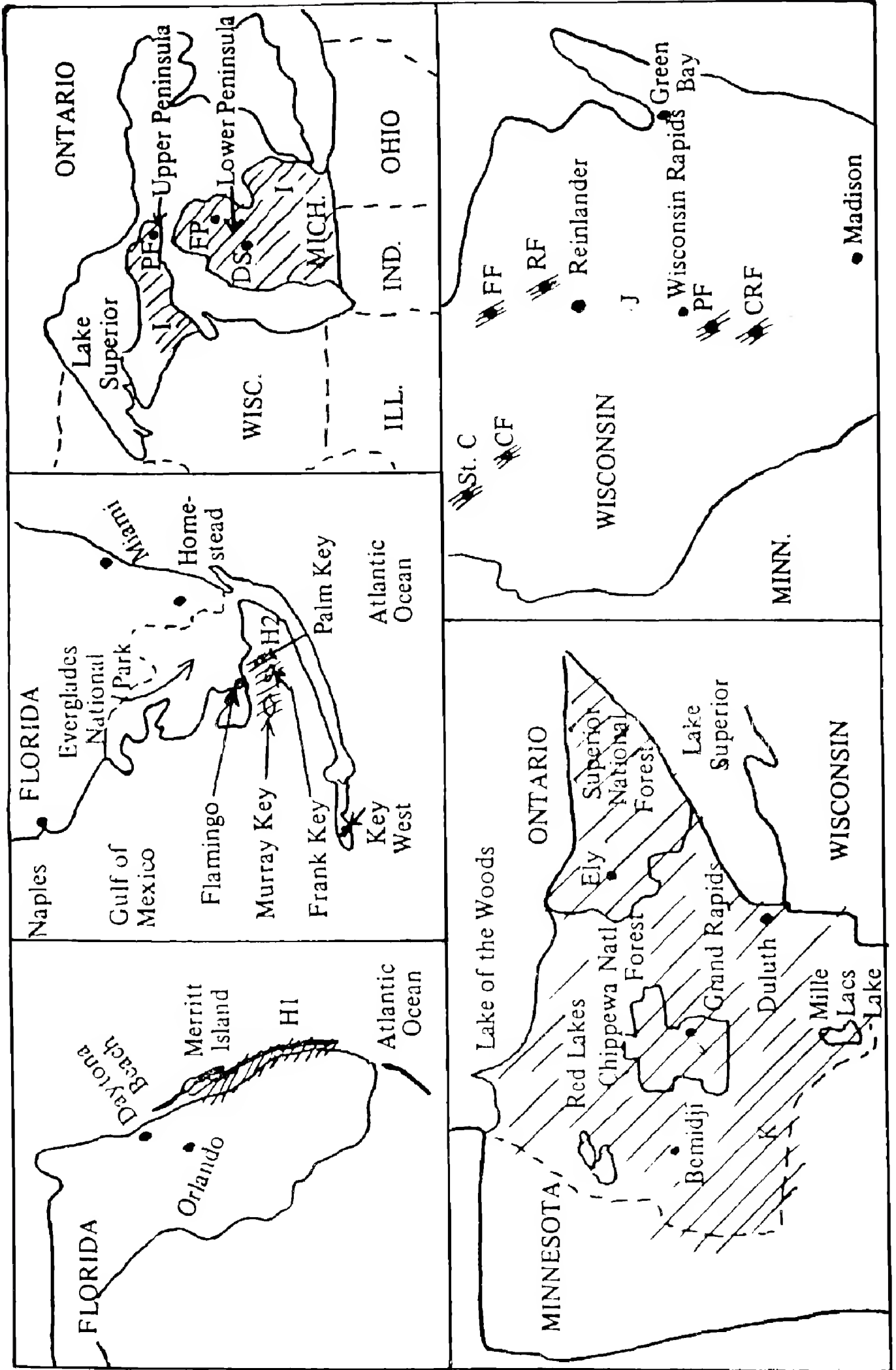
Chronology:

Spring arrival	permanent residents
Eggs laid	peak early December to January
Eggs hatched	1 December-1 April
"Fledging" (first flight)	February-May
Fall departure	unknown (dispersal)

Summary: *History*—Ogden initiated the study in 1968 as a National Park Service Research Project. As of 1969 he has prepared 2 mimeographed preliminary reports (26). *Study includes*—locating nests, hatching success, behavior, banding and color-marking, prey survey, mortality factors, and pesticide analysis of eggs. *Population success*—general trend not known; often two eggs hatch when three laid. *Mortality factors*—young fall from nests at pre-flight stage. *Primary prey*—catfish of the genus *Galeichthys*, jacks (*Caranx* sp.), mullet (*Mugil* sp.). *Pesticide analyses*—eggs have been sent to the Patuxent Pesticide Research Laboratory. *Techniques*—Ogden is working on aging and identification of sub-adult birds by using birds of known age, identified by colored celluloid bands.

I—Michigan (Roscommon, Mecosta, Alpena, and Montmorency Counties: Dead Stream Flooding, Fletcher Pond, Potagonissing Flowage, and Backus Creek Flooding. Entire state).

Investigator: Postupalsky, 1965-1969.



Chronology: (Postupalsky (pers. comm.))

Spring arrival	24 April
Eggs laid	9 May
Eggs hatched	15 June

Summary: *History*—Postupalsky initiated study in 1965. Prior observations were made during his Bald Eagle surveys. Postupalsky surveys the areas mentioned above and the Lake Nipigon area in Ontario. He has published (27, 30) and compiled several progress reports (28, 29). *Study includes*—locating nests, hatching success, banding, mortality factors, erection of artificial nesting platforms and pesticide analysis of eggs. *Population success*—Postupalsky states that the Michigan population is decreasing (27). *Mortality factors*—loss of eggs from nests, causes unknown. *Techniques*—erection of artificial nesting platforms in flowages. Platforms approximately seven feet above surface of the water.

J—Wisconsin: (Entire state; Flambeau Flowage (FF), Chippewa Flowage (CF), Petenwell Flowage (PF), Rainbow Flowage (RF), Castle Rock Flowage (CRF), St. Croix Fl. (St. C)).

Investigators: Ingram, 1966; Berger and Mueller, 1950-1966 (Rainbow Fl.), N.C.A.C. (North Central Audubon Council).

Summary: *History*—In 1950 Berger and Mueller initiated a study on the Flambeau Flowage (8), and continued it through 1965. In 1966 the N.C.A.C. initiated a three-state (Michigan, Wisconsin, and Minnesota) study (see Ingram, 18). Present work is being done by Sindelar, Wisconsin Ornithological Society. Postupalsky summarized three-state study in (28). *Nest site selection*—trees, stumps, and gregarious on flowages. *Population success*—decline on Flambeau Fl. *Pesticide analyses*—fish from flowages. *Techniques*—dho-gaza for adults (17).

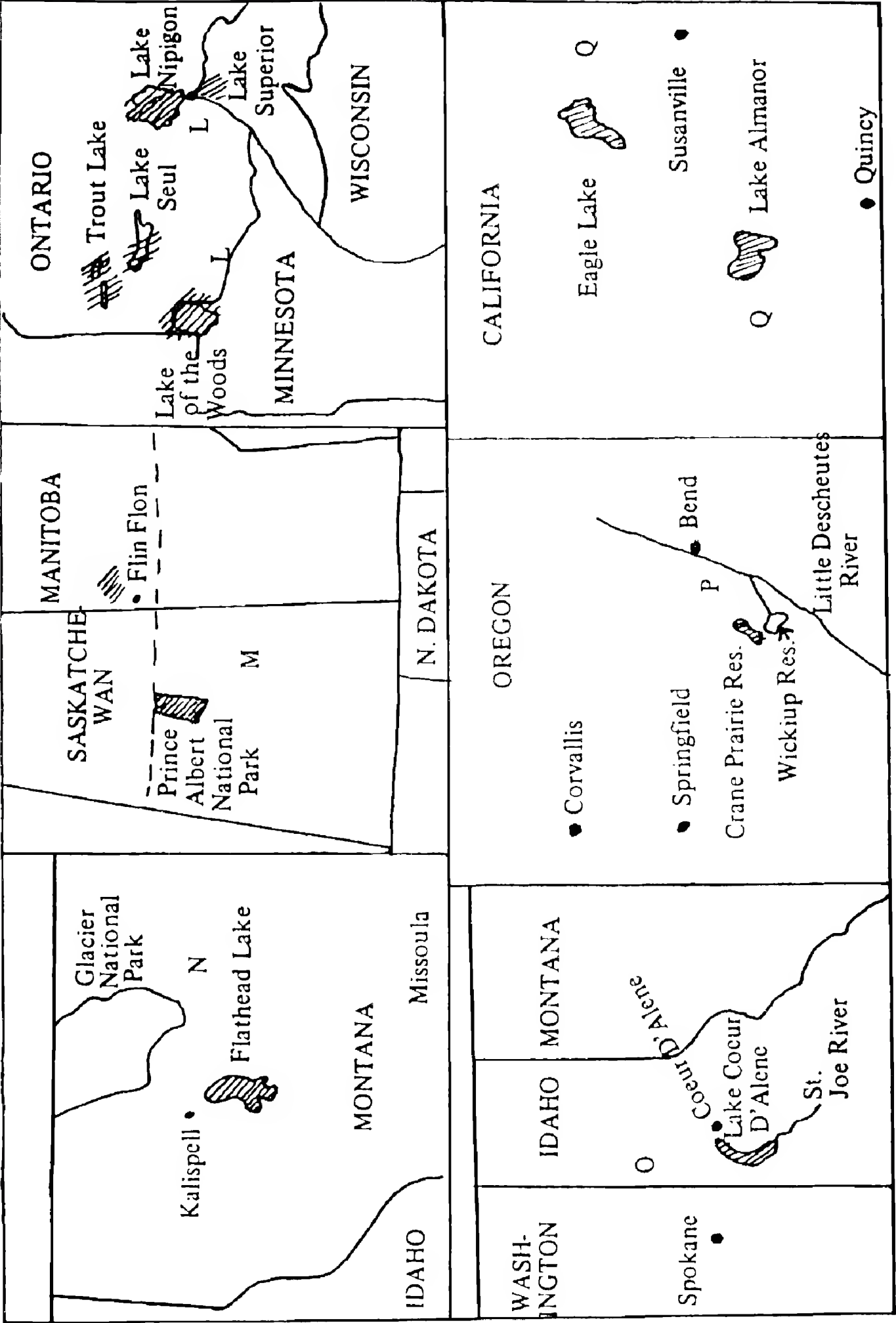
K—Minnesota (Entire state; Chippewa Nt. For. (JM); Portions of C.N.F. and adjacent Counties; Superior Nat. For. (LM)).

Investigators: Dunstan, Mathisen, 1963-1969; Magnus, 1966-1969.

Chronology:

Spring arrival	25 April
Eggs laid	10 May
Eggs hatched	14 June
"Fledging" (first flight)	11 August
Fall departure	11 September

Summary: *History*—surveys initiated in 1963. Related publications: Mathisen (22-24) and Dunstan (9-11). *Study*



includes— locating nests, nesting success, nesting ecology, behavior at and away from nests, prey survey, and pesticide analysis of prey. *Nest site selection*— usually dead or partially dead conifers (*Pinus* sp., *Picea* sp.) and occasionally power line support poles (9, 11). No colonies found. *Population trend*—no conclusions. *Mortality factors*—electrocution of one adult male 1968 and one nestling in 1966; one adult shot in 1968; nests blown down and destroying eggs and young. *Primary prey*—73% centrarchids (*Lepomis* sp., *Micropterus* sp., *Pomoxis* sp.), and yellow perch (*Perca* sp.). *Pesticide analyses*—fish analyzed by Minn. State Cons. Dept. (25). Prey species are being analyzed by Dunstan. *Techniques*—a camera apparatus used for indirect viewing of nest contents (10).

L—Province of Ontario, Canada.

Investigators: Grier, 1967-1969 (western Ontario); Postupalsky, 1969 (Lake Nipigon and Ogoki Res) (see K).

Summary: In 1967 Grier checked 65 nests which he believed represented 57 territories (term territory not defined). Number of nests known or believed to have young totaled 35. Grier found one young shot on nest, one young dead in nest structure, and three addled eggs. Grier's 1968 and 1969 data not compiled (see 16). In 1969, Postupalsky (pers. comm.) found 11 pairs of which six produced a total of 10 young which were seen in an advanced stage of development. Dunstan reports the results of nests in the boundary waters of Minnesota with the Minnesota data. The chronology of the boundary water nests not included.

M—Provinces of Manitoba and Saskatchewan, Canada (Prince Albert National Park).

Investigators: Dutcher, 1969 (P.A.N.F.); Whitfield and Gerrard, 1967-1969; Houston, 1965-69 (banding nestlings).

Summary: *History*—Dutcher will initiate survey in 1970. Park Wildlife Observation Cards will be processed. Whitfield and Gerrard made observations while conducting Bald Eagle surveys. Houston has had two banding returns and requests data withheld. *Nest site selection*— in Manitoba 16 nests along a powerline in 1969 (W&G).

N—Montana (Flathead and Lake Counties; Flathead Lake area).

Investigators: D. L. MacCarter, Koplin, D. S. MacCarter, 1966-1969.

Chronology:

Spring arrival	15-30 April
Eggs laid	15-30 May

Eggs hatched	15 June
"Fledging" (first flight)	15 August
Fall departure	25 October

Summary: *History*—Koplin, D. L. and D. S. MacCarter initiated the study in 1966. They published in 1969 (21) and also compiled 2 progress reports. *Study includes*—locating nests, reproductive success, nest site selection, behavior, fishing success, prey analysis and survey, mortality, and egg shell measurements. Analysis of eggs, prey, water, and related aquatic organisms for pesticide residues. *Nest site selection*—all nests found were on tops of yellow pines (*Pinus ponderosa*) and black cottonwoods (*Populus tricarpa*); 87% were in dead trees. *Population success*—young fledged show 30% annual decline between 1967 and 1968 (21). *Mortality factors*—shooting documented. Pesticides suspected based on egg shell thinning and addled eggs (21). *Primary prey*—largescale sucker (*Catostomus macrocheilus*). Also pumpkinseed (*Lepomis gibbosus*), pea mouth (*Mylocheilus caurinus*), catfish (*Ictalurus melas*) and cutthroat trout (*Salmo clarki*). *Pesticide analyses*—three addled eggs had 37 to 59 ppm (dry wt.) DDT residues, and all contained dead but well developed embryos (21). Additional egg data unpublished. Pesticide analysis of water, plankton, and sediment from Flathead Lake. Flathead Lake has residues. *Techniques*—picric acid and color bands used for color-marking. Egg shell thickness measured with a Helios micrometer to nearest 0.01 mm (See 19).

O—Idaho (Kootenai and Benewah Counties; St. Joe River and upper Coeur D' Alene Lake).

Investigators: Johnson and Shroeder, 1969.

Summary: *History*—Johnson and Shroeder initiated the study in 1969. Future plans are to survey northern Idaho and eastern Washington. They will also construct nesting platforms on pilings in the Coeur D' Alene River and band nestlings. One encouraging note from Johnson is that past records indicate that one local colony has increased in size during the past decade.

P—Oregon (Deschutes and Klamath Counties; Crane Prairie Reservoir).

Investigator: Roberts, 1969

Chronology:

Spring arrival	12 April
Eggs laid	_____
Eggs hatched	_____

“Fledging” (first flight) 5 August
Fall departure 1 October (last bird seen)

Summary: *History*—In 1969 the U. S. Forest Service established the Crane Prairie Reservoir Osprey Management Area, located in the Deschutes National Forest. It includes the reservoir and a 5,300 acre strip around it. Roberts is investigating reproductive success, nest site selection, territory, and migration.

Q—California (Lassen Volcanic National Park region; Eagle and Almanor lakes).

Investigators: Garber and Koplin, 1970.

Summary: *History*—Garber and Koplin will initiate a study in 1970 similar to that done in Montana.

Year	No. of known nests	No. of active nests	No. of active nests with known out- come	No. of successful nests		No. of eggs laid	No. of eggs hatched	No. of young fledged	Young per success- ful nest
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

A—Maine

					%				
1964	13	8	8	2	25	--	--	3	1.5

B—Massachusetts

					%				
1969	24	17	17	8	51	52	11	11	1.3
1968	25	23	23	11	47	48	30	23	2.1
1967	20	15	15	4	26	30	8	5	1.2
1966	19	17	17	5	29	52	9	6	1.2
1965	15	15	15	7	41	40	9	9	1.3
1964	11	11	11	6	54	29	15	15	2.5

[Also in 1969—3 pairs at Martha’s Vineyard; 1 pair each at Duxberry, Marshfield, and Wellfleet. Spitzer (35) reports the last two unproductive and the third fledged young.]

C1—Rhode Island

					%				
1969	17	8	---	3	---	---	---	4	1.2
1968	19	7	---	3	---	---	---	5	1.6
1967	19	4	---	0	---	---	---	0	0.0
1966	32	16	---	0	---	---	---	0	0.0
1965	36	23	---	5	---	---	---	8	1.6

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

C1—Rhode Island (continued)

1964	43	24	—	7	—	—	—	12	1.7
1963	60	40	—	14	—	—	—	23	1.6
1962	60	33	—	10	—	—	—	13	1.3
1961	75	55	—	10	—	—	—	11	1.1

[Town of Swansea, Bristol Co., had 1 active nest in 1961, and success not recorded; Kent Co. had two active nests. One was successful and fledged one young.]

C2—Rhode Island

					%				
1963	5	3	0	—	—	—	—	—	—
1962	6	3	0	—	—	—	—	—	—
1961	6	3	3	—	—	—	—	—	—
1960	7	3	3	2	66	—	—	—	—
1959	6	3	3	3	100	—	—	—	—
1958	6	3	3	3	100	—	—	—	—

[Since 1967 no known nests in study area (however, see note under C1 above).]

D—Connecticut

					%				
1963	—	24	24	—	—	69	—	9	—
1962	—	31	31	—	—	90	—	8	—
1961	—	31	31	—	—	77	—	12	—
1960	—	71	71	—	—	204	—	7	—
1959	—	46	46	—	—	—	—	—	—
1958	—	39	39	—	—	—	—	13	—
1957	—	35	35	—	—	—	—	13	—

[Spitzer (35) reports the following for 1969 (active nests/productive nests/fledged young): a) scattered nests 6/2/4; b) Old Lyme-Niantic area (experimental nests, eggs from Maryland) 10/8/21; c) putative success of connecticus nestings *without* egg transfer 16/7/11.]

E—New York

[Spitzer reports the following for 1969 for Long Island and Vicinity (active nests/productive nests/fledged young): Fisher’s Island, N.Y., 5/2/4; Plum Island, N.Y. (inaccessible) 3+/?/?; Orient Point west to Greenport, N.Y., 8/0/0; Shelter Island, N.Y., 17/6/9; Gardiner’s Island, N.Y., 38/17/25; Eastern Long Island west to Brookhaven, N.Y., 18/?/?(6+).]

F1—New Jersey

					%				
1969	—	45	—	10	—	—	—	15	1.5
1968	—	42	—	8	—	—	—	10	1.3
1967	—	—	—	11	—	—	—	17	1.5
1966	—	—	—	18	—	—	—	30	1.7

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
F1—New Jersey (continued)									
1965	---	---	---	15	---	---	---	25	1.7
1964	---	---	---	20	---	---	---	35	1.8
1963	---	---	---	11	---	---	---	18	1.6
1962	---	---	---	13	---	---	---	20	1.5
1961	---	---	---	---	---	---	---	14	---
1960	---	---	---	18	---	---	---	28	1.6
1959	banded by another person								
1958	---	---	---	20	---	---	---	28	1.4
1957	---	---	---	16	---	---	---	28	1.8
1956	---	---	---	---	---	---	---	26	---
1955	---	---	---	---	---	---	---	32	---
1954	---	---	---	23	---	---	---	47	2.0
1953	---	---	---	---	---	---	---	21	---
1952	---	---	---	20	---	---	---	35	1.8
1951	---	---	---	12	---	---	---	22	1.8
1950	---	---	---	---	---	---	---	34	---
1949	---	---	---	1	---	---	---	1	1.0
1948	banded by another person								
1947	---	---	---	---	---	---	---	18	---
1946	---	---	---	---	---	---	---	35	---
1945	---	---	---	12	---	---	---	30	2.5
1944	---	---	---	6	---	---	---	15	2.5

F2—New Jersey [Data for all nine areas taken from Schmid (33).]

1937		1938		1939		1963	
nests	young	nests	young	nests	young	nests	young
27	53	21	45	25	56	7	0

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
G1—Maryland									

					%				
1968	---	31	21	9	43	44	19	5*	1.8
1967	---	29	23	9	39	35	14	9	1.5
1966	---	24	17	7	41	13	11	6**	1.7

* 4 hatchlings did not fledge. **1 hatchling did not fledge.
 [The above data from Reese (31). Additional information on breeding success for Talbot Co. is in press and will appear in the *Auk*. Reese mentions that in 1968 censusing was done along the Chaptank River (see map) by George Krantz, and along the tidewater region of Pender and Onslow Counties, Maryland, and lake region of Craven Co., North Carolina.]

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

G2—Maryland

					%				
1969*	91	--	--	--	--	--	---	---	---
1968	60	31	31	10	31	78	17	14	1.4
1967	59	52	52	32	61	108	71	54	1.7

*Because of egg exchange experiments Wiemeyer requests that 1969 data be summarized as follows: Per cent eggs hatched—34%; per cent young fledged of young hatched—70%; young fledged per successful nest—1.85; young fledged per active nest—0.57; per cent nests successful—32%.

H1—Florida

					%				
1969	9	7	7	6	86	--	---	7	1.2
1968	11	9	9	7	78	--	---	10	1.4
1967	7	7	7	7	100	---	---	12	1.7
1966	21	18	18	12	67	--	---	--	--
1965	15	15	15	11	73	---	---	---	---
1964	31	26	26	--	--	---	---	---	---

H2—Florida

					%				
1969	138*	39	39	28	72	---	---	45	1.6
1968	141*	44	44	30	68	---	---	56	1.8

*For all Florida Bay; rest are for Murray, Frank, and Palm Keys.

I—Michigan

					%				
1969	---	67	---	23	--	---	---	33	1.4
1968	---	70	69	25	36	--	---	40	1.6
1967	---	--	62	17	27	---	---	30	1.7
1966	---	---	50	9	18	---	---	15	1.6
1965	---	51	50	11	22	--	---	18	1.6

J—Wisconsin

					%				
1967*	104	75	71	36	50.7	--	---	66	1.83
1966*	104	74	67	19	38.4	---	---	--	1.68
1965	7	--	--	1	---	---	---	1	1.0
1963	14	---	---	3	---	---	---	3	1.0
1962	17	---	---	4	---	---	---	5	1.25
1961	15	---	---	4	---	---	---	5	1.25
1960	14	--	--	8	---	---	---	12	1.5
1959	13	--	---	7	---	---	---	7	1.6
1958	14	---	---	10	---	---	---	21	2.00
1957	--	---	---	9	--	---	---	21	2.3
1956	15	---	---	5	---	---	---	11	0.7
1955	27	--	---	12	---	---	---	22	1.8

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
J—Wisconsin (continued)									

1954	20	---	---	10	---	---	---	17	1.7
1953	19	---	---	14	---	---	---	25	1.8
1952	20	---	---	10	---	---	---	23	2.3
1951	—	---	---	7	---	---	---	14	2.0
*From Postupalsky (28); 1951-1965, for the Flambeau Flowage only, Berger and Mueller (8).									

K—Minnesota

					%				
1969	144	63	---	31	---	---	---	66	2.0
1968	132	79	---	50	---	---	---	81	1.6
1967	119	60	---	36	---	---	---	59	1.6
1966	58	22	---	19	---	---	---	25	1.3
1965	29	15	---	14	---	---	---	23	1.6
1964	21	15	---	13	---	---	---	22	1.7
1963	16	16	---	14	---	---	---	21	1.5

[Ingram (18) independently surveyed Minnesota in 1967.]

M—Provinces of Manitoba and Saskatchewan, Canada

					%				
1969	32*	21	---	---	---	---	---	37**	---
1968	7*	5	---	---	---	---	---	8**	---
1967	2*	2	---	---	---	---	---	3**	---

*Territories (term territory not defined). **Nestlings (minimum number).
[Data above from Whitfield and Gerrard.]

N—Montana

					%				
1969	47	20	---	9	---	34	20	15	1.6
1968	46	20	---	8	---	22	14	14	1.7
1967	36	16	---	8	---	28	18	17	2.1
1966	28	16	---	---	---	---	---	---	---

O—Idaho

					%				
1969	26	22	---	---	---	---	---	---	---

P—Oregon

					%				
1969	85	48	43	25	58	---	---	35	1.4

Acknowledgments. I would like to thank those cooperators who graciously gave of their time and data. Without such excellent cooperation this study would not have been possible. I would also like to thank M. A. Dunstan for considerable clerical help including drawing and labeling maps. I am grateful to the Raptor Population Committee for authorizing this study, to Byron E. Harrell for suggestions, and to the Raptor Research Foundation and the Biology Department at the University of South Dakota for financial support.

Cooperators. Names and addresses of persons cooperating in the 1969 Continental Osprey Survey are as follows:

- Dr. Peter L. Ames, 2713 Walnut Avenue, Evanston, Illinois 60201
 Mrs. Francis H. Brown, 6 Manor Drive, Warwick, Rhode Island 02886
 Dr. Robert S. Cook, University of Wisconsin, Green Bay Center, 1567 Deckner Avenue, Green Bay, Wisconsin 54302
 Mr. Thomas C. Dunstan, Biology Department, University of South Dakota, Vermillion, South Dakota 57069
 Mr. R. L. Dutcher, Park Naturalist, Prince Albert National Park, Box 68, Waskesiv, Saskatchewan, Canada
 Mr. Lon Ellis, 950 N. Tropical Trail, Merritt Island, Florida 32952
 Mr. David Emerson, 1144 Burt Street, Taunton, Massachusetts 02780
 Mr. and Mrs. Gilbert Fernandez, P. O. Box 53, Dartmouth, Massachusetts 02714
 Mr. James Grier, Laboratory of Ornithology, Cornell University, Ithaca, New York 14850
 Dr. Charles J. Henny, Dept. of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon 97331
 Dr. Stuart Houston, 863 University Drive, Saskatoon, Saskatchewan, Canada
 Mr. Joseph A. Jacobs, 1928 Hillcrest Avenue, Pennsauken, New Jersey 08110
 Dr. Donald R. Johnson, Department of Biological Sciences, University of Idaho, Moscow, Idaho 83843
 Mrs. Kenneth Kinsey, 344 Cowesset Road, Warwick, Rhode Island 02886
 Dr. James R. Koplin, Department of Wildlife Management, Humboldt State College, Arcata, California 95521
 Mr. Channing R. Kury, 246 Arch Street, Sunbury, Pennsylvania 17801
 Mr. Donald L. MacCarter, 4150 Rohm Rd., Apt. 23, St. Paul, Minnesota 55111
 Mr. Douglas S. MacCarter, 3329 Poly Drive, Billings, Montana 59102
 Mr. John E. Mathisen, Wildlife Biologist, Chippewa National Forest Headquarters, Cass Lake, Minnesota 56633

- Mr. John Ogden, Everglades National Park, P. O. Box 279, Homestead, Florida 33030
- Mrs. Mathias Oppersdorf, R.F.D. No. 1, Matunuck, Rhode Island 02879
- Mr. Sergej Postupalsky, 3926 W. 13 Mile Rd., Royal Oak, Michigan 48073
- Mr. Jan G. Reese, Box 298, St. Michaels, Maryland 21663
- Mr. Hadley Roberts, 211 E. Revere Street, Bend, Oregon 97701
- Mr. Frederick C. Schmid, Morton National Wildlife Refuge, R.D. 359, Noyac Road, Sag Harbor, New York 11963
- Mr. Paul Spitzer, Department of Biology, Wesleyan University, Middeltown, Connecticut 06457
- Mr. Alexander Sprunt, IV, Research Director, National Audubon Society, Box 231, Tavernier, Florida 33070
- Mrs. H.V.S. Tingley, 23 Union Street, Bristol, Rhode Island 02808
- Mr. D. W. Whitfield, 1306 Melrose Avenue, Saskatoon, Saskatchewan, Canada
- Mr. Stanley N. Wiemeyer, Patuxent Wildlife Research Center, Laurel, Maryland 20810

Literature Cited

1. Abbott, C. A. 1911. The home-life of the osprey. Witherby and Company. London. 53 p.
2. Allen, C. S. 1892. Breeding habits of the fish hawk on Plum Island, New York. *Auk*. 9:313-321.
3. Ames, P. L. 1968. L'histoire recente du balbuzzard dan le sud du Connecticut U.S.A. *Aves*. 5:16-22.
4. 1966. DDT residues in the eggs of the osprey in the north-eastern United States and their relationship to nesting success. *J. Appl. Ecol.* (suppl.), 87-97.
5. 1964. Notes on the breeding behavior of the osprey. *Atlantic Naturalist*. 19:15-27.
6. 1961. A preliminary report on a colony of ospreys. *Atlantic Naturalist*. 16:26-33.
7. and G. S. Mersereau. 1964. Some factors in the decline of the osprey in Connecticut. *Auk*. 81:173-185.
8. Berger, D. D. and H. C. Mueller. 1969. Ospreys in northern Wisconsin, Pp. 340-341 *In* Peregrine falcon populations: their biology and decline (J. J. Hickey, Ed.). Madison, Univ. of Wisconsin Press.
9. Dunstan, T. C. 1968a. Breeding success of osprey in Minnesota from 1963-1968. *Loon*. 40:109-112.
10. 1968b. A camera research apparatus for investigating nests of canopy or cavity nesting birds. *Loon*. 40:115-117.
11. 1967. A study of osprey in Itasca County, Minnesota. M.A.

- Thesis. Dept. of Zoology, Univ. of South Dakota, Vermillion, South Dakota. 66 p.
12. Emerson, D. and M. Davenport. 1963. Profile of the osprey. *Naragansett Naturalist*. 6:56-58.
 13. Fernandez, J. and G. 1969. Ospreys at Westport. *PSA Journal*. Pp. 30-36.
 14. Fernandez, G. and J. 1966. Ospreys at Westport. *Massachusetts Audubon*. 51:12-21.
 15. Gill, T. 1901. The osprey or fishhawk; its characteristics and habits. *Osprey*. 5:11-12, 25-28, 40-42, 60-61, 73-76, 92-93, 105-106, 124-125, and 141.
 16. Grier, J. W. 1967. Osprey nesting survey, western Ontario Canada, 1967. (mimeo.) 1p.
 17. Hamerstrom, F. 1963. The use of great horned owls in catching marshhawks. *Proc. 13th Intern. Ornithol. Congr.* Pp. 866-869.
 18. Ingram, T. N. 1967. Status of the osprey in Minnesota—1967. North Central Audubon Council. (mimeo.) 12 p.
 19. Koplin, J. R., D. L. and D. S. MacCarter. Flathead Lake osprey study. Progress Reports. Numbers 1 and 2 (mimeo.)
 20. Kury, C. R. 1966. Osprey nesting survey. *Wilson Bulletin*. 78:470.
 21. MacCarter, D. L., J. Koplin, and D. S. MacCarter. 1969. Pesticides and reproductive failure in the osprey. *California-Nevada Section TWS 1969 Transactions*. Pp. 18-24.
 22. Mathisen, J. E. 1969. Bald eagle-osprey status report, 1969, Chippewa National Forest, Minnesota. *Loon*. 41:84-87.
 23. 1968. Bald eagle-osprey status report, 1968, Chippewa National Forest, Minnesota. *Loon*. 40:97-99.
 24. 1967. Bald eagle-osprey status report, 1967, Chippewa National Forest, Minnesota. *Loon*. 39:121-122.
 25. Moyle, J. B. and J. L. Skyrpek. 1969. Levels of DDT, DDE, and Aldrin in muscle and brain tissue of some Minnesota fishes, 1962-1967. *Minn. Cons. Dept. Publ 59*. (mimeo.) 5 p.
 26. Ogden, J. C. Florida Bay osprey population study-preliminary reports 1 and 2. (mimeo.)
 27. Postupalsky, S. 1969. The status of the osprey in Michigan in 1965, Pp. 338-340. *In* Peregrine falcon populations: their biology and decline. (J. J. Hickey, Ed.) Madison, Univ. of Wisconsin Press.
 28. 1968. The status of osprey in the north-central United States, 1967. Univ. of Michigan Biological Publ. (mimeo.) 17 p.
 29. Additional progress reports from 1965-1969. Unpublished. Suggested terminology for bald eagle and osprey study. *In* North Central Audubon Council. Mimeo. 1968.
 30. and J. P. Kleiman. 1965. Osprey preys on turtle. *Wilson Bulletin*. 77:401-402.

31. Reese, J. 1968. Breeding osprey survey of Queen Annes County, Maryland. *Maryland Wildlife*. 24:91-93.
32. Additional progress reports, 1-5, Queen Annes and/or Talbot County.
33. Schmid, F. 1966. The status of the osprey in Cape May County, New Jersey between 1939 and 1963. *Chesapeake Science*. 7:220-223.
34. Stickel, L. F., F. C. Schmid, and W. L. Reichel. 1965. Ospreys in Connecticut and Maryland. *Fish and Wildlife Circular* 226. Pp. 4-6.

Addenda.

35. Finch, Davis, W. 1969. Northeastern Maritime Region. *Audubon Field Notes* 33:637-643.

A PROGRAMME FOR BREEDING GOSHAWKS (*Accipiter gentilis gentilis*) IN CAPTIVITY WITH REFERENCE TO THEIR BREEDING HABITS IN THE WILD STATE

By David Kent
13, Achnamara, Lochgilphead,
Argyle, Scotland

In an attempt to induce such a highly strung genus of raptors as *Accipiter* to reproduce in captivity, I feel that more must be taken into consideration than in the cases of species from the genus *Falco*. A great attempt must be made to re-create, or compensate for natural circumstances before any extent of success can be anticipated. The degree of difficulty to induce the different species to breed will vary according to several factors. The great difference in size which occurs between, for example, Goshawks (*A. gentilis gentilis*) and Sparrow-hawks (*A. nisus nisus*), will grossly influence the minimum dimensions of suitable aviaries. Also, according to the size of the species, there will be a vast difference in the types of quarries upon which they feed in the wild state. Consequently, smaller species which prey chiefly upon small birds will be more trouble to maintain than larger species which feed on larger quarries and which to some degree would thrive on coarser foods.

Of the European, diurnal Raptors, the Goshawk is the species in which the breeding impulse awakens earliest in the year. It usually happens sometime in January, however, sometimes not until early February. The initiative to breed is taken by the female, which having located the nesting site of the previous season, sits by the nest and proceeds to scream in order to attract a mate.

An aviary designed to accommodate a pair of Goshawks which is programmed for breeding would have to be furnished and ready to receive the first hawk by the end of the year. I hesitate to commit myself into quoting overall dimensions; however, a description of what I consider to be the necessary furnishings will perhaps help to establish the approximate surface area. It should be rectangular in shape, possibly with rounded ends to prevent the female from cornering the male; it should contain, either by being built around, or by being planted with a tree at one end. The tree ought to have a crotch or a fork about 8 ft. above ground level. This will accommodate the nest, which if available, could consist of an abandoned Buzzards nest. A suitable type of tree would be an old apple or a pear. A second tree which offers a perch overlooking the nest, or some form of alternative perch should be placed at the other end of the aviary. A fir of some sort would be the most suitable. In the wild state, nesting Goshawks usually roost in a fir and sometimes fly quite a distance from the nest in order to find one. The male hawk does most of the nest building while the female perches close

by in a neighbouring tree.

Copulation seldom takes place on the nest itself. It usually happens on the perch on which the female idles the day away. The initiative is taken by the male which incites the female with a call, repeated twice or three times. This is answered by the female as he glides from his perch. From a shallow stoop he throws up on to her back and copulation takes place. Pairing takes place on awakening and is repeated several times throughout the course of the morning. Nest building is often interrupted for pairing.

Where old nests are re-occupied, the structures are restored with a layer of fresh twigs. Sprays of Spruce or Scots Pine, or live, green twigs in deciduous forests decorate the upperpart of the nest and green twigs line the bowl. The female usually assists with the lining of the bowl, in fact she adds twigs even after the male completely ceases working on the nest. This lining of the nest may be repeated until well into the period of growth of the offspring.

A plentiful supply of twigs and evergreen foliage should be available to the pair in the aviary so that they may restore the structure of the provided nest, if this is occupied.

Some form of "break" to prevent hawks newly introduced to the aviary from damaging themselves by flying against the wire-mesh walls would best be arranged. Foliage of Spruce, Yew, or similar species of conifer could be woven into the mesh of areas of the sides. A whole end could be screened off by such a method and used to conceal any filming or observation. The corners, if the ends are not rounded, should be planted with shrubs and crossed with branches at higher levels.

When kept in an aviary, Goshawks, especially freshly caught birds, will fly up against the roof. The usual result is a hawk with a bald head, if not a badly damaged one. A wire mesh roof is essential, but unless shielded may cause a highly strung bird to suffer bad head grazes. A ceiling of string net fastened at a height of 6" to 9" below the actual roof would prevent any contact with the wire. For various reasons a single roof of string-mesh would not be suitable. It would not, for example, support snow very efficiently. Snow would adhere to such a roof for a greater length of time. Debris in the form of fallen leaves, twigs and small branches would entangle and be a great trouble to remove.

Goshawks become sexually mature after the first moult and breed for the first time the following Spring. From the choice between the wild caught adult and the juvenile taken from the nest and moulted out in captivity, the latter bird is the more suitable. Due to its having been in captivity since leaving the nest, it will to some degree be more amenable to accepting the breeding quarters than would be the wild caught adult.

The female bird should be introduced to the aviary about late December at the latest. She should come into breeding condition

some time in January. This state will be indicated by her frequent screaming. At this stage the male can be introduced. It might be wise to first parade the male before her on the fist in order to ascertain her response to him as being satisfactory. If she is ready for him she ought to scream violently. Other display such as squatting on the perch will also indicate her readiness to accept the male. To introduce the male too soon could result in his death. I have the unfortunate experience of Goshawks kept together in aviaries killing each other and I would consequently hesitate ever to put two birds together again before the appropriate time. For the first time together they ought to be kept under close observation, especially the first time food is presented.

As soon as wild hawks have paired, the male alone hunts. All items of prey are brought to the nest deplumed and with the head consumed. Hunting is generally carried out about an hour or two after dawn. The male is incited into hunting by a call uttered by the female. Very often he is nest-building at the time; however, on being incited he abandons what he is doing and disappears into the forest for a period, usually of between 1½ and 2½ hours. If she feels hungry, the female will incite a second hunting excursion later in the afternoon.

The quarries taken by the male Goshawk during breeding probably differ somewhat from those taken outside the breeding season. All preys killed during the breeding season must be carried to the nest and consequently, need to be of a lesser size to those frequently recorded during the Autumn. Most items of prey are brought back to the nest deplumed to such an extent that they are beyond identification. Of those quarries that I have seen brought to the nest between the months of January and April, I have succeeded in identifying only a few. In three cases I could clearly define the blue, upper wing coverts of Jays (*Garrulus glandarius*); I suspected several other corpses that I saw delivered as belonging to Jays. Only once, to my surprise, did I see Red Squirrel (*Sciurus vulgaris*) brought. A Fieldfare (*Turdus torquatus*) and a Green Woodpecker (*Picus viridis*) were the only other identified species. From litter found beneath the nest I have identified feathers of Wood Pigeon (*Columba palumbus*), Magpie (*Pica pica*), Tawny Owl (*Strix aluco*), Hazel Hen (*Tetrastes bonasia*). The greater part of the litter consisted of miscellaneous thrush to pigeon sized bird feathers, most of which were difficult to identify. Also amongst litter I found the halsband of a Red Squirrel which had been marked locally during a study of the movement of this species of mammal. Birds clearly constituted the major part of the Goshawks diet during this period.

The birds in the aviary should be provided with a variety of food consisting of as much bird as possible. As much legitimate quarry as is available should be brought in by the gun and the trap. Moorhens, Coots, gulls, corvids, Starlings, Sparrows and Pigeons can legally be

taken. Rabbits, Squirrels, leverets, and small rodents too can be fed. In emergencies, Fox, beef or chicken heads will substitute. A sparrow-trap and a mist net, available from S. Young & Sons, Crewkerne, Somerset, Great Britain, left constantly set will ensure a steady supply of Sparrows and Starlings. Food should be available to the hawks *ad libitum*.

In Scandinavia, egg laying begins between the last quarter in March and the middle of April. Incubation commences after the laying of the first egg. The incubation period varies from between 41 and 43 days.

On the delivery of prey at the nesting site, the male reports his return by calling as he approaches. The female then leaves the nest to receive him and collect whatever he has brought. During the early days of incubation, the male broods the clutch while his mate feeds. However, as incubation progresses, it is with every increasing reluctance that the female is lured away from the nest to receive her food. He will attempt to lure her from the nest, but on failing deposits the prey some distance away. During a study of Goshawks in 1937, a Danish observer commenced to place plucked bodies of birds, heads removed, at the base of the nest tree, having established that the male of a pair had vanished, the female had incubated for 5 days uninterrupted without food. This female accepted the presentation of food as the bodies disappeared and she continued incubation without interruption. This assistance was provided for a period of ten days at the end of which, in some unknown way, she secured a fresh mate.

Through unforeseen circumstances, it could happen that the presence of the male hawk in the aviary becomes undesirable. From the above account it would seem safe to consider removing him and to provide the female with plucked, decapitated birds. In fact after the first 18 days of incubation period, the period during which the male also takes part with brooding, the male in the aviary will no longer have any purpose to serve. Captivity may possibly influence the behaviour of the bird that is denied the freedom of natural circumstances such that it becomes desirable that it be removed. If copulation has been observed to have taken place and there comes about an abandoning of the clutch after incubation has commenced, or if incubation does not commence at all, the eggs should be tried in an incubators. Buzzards are known to become broody when kept in captivity and could probably be employed as prospective foster mothers for Goshawk eggs.

Some data are available concerning incubation temperatures of the Goshawk at the different stages of incubation, however, more data are required, especially concerning nest humidity and also nest behaviour. Artificial insemination has been contemplated and would be an ultimate solution if there was found to be a predominant reluctance to copulate.